# TMG120N20T

## N -Channel Enhancement Mosfet

### General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

### Applications

- Load switch
- PWM

### General Features

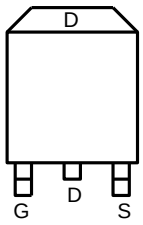
$V_{DS}$ =200V $I_D$= 120A

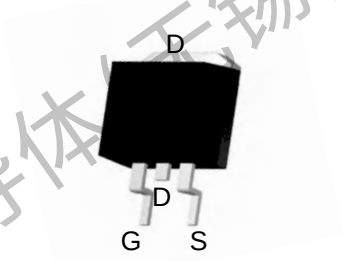
$R_{DS(ON)}$= 8.8 mΩ(typ.) @ $V_{GS}$= 10V

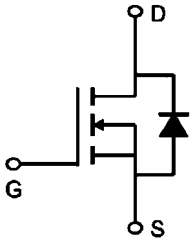
100% UIS Tested

100% $R_g$ Tested

T:TO-263-3L




Marking: G120N20

### Absolute Maximum Ratings ($T_C$ = 25°C Unless Otherwise Noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 200 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 120 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 81 | A |
| $I_{DM}$ | Pulsed Drain Current | 460 | A |
| EAS | Single Pulse Avalanche Energy | 324 | mJ |
| $I_{AS}$ | Avalanche Current | 36 | A |
| $P_D$ | Total Power Dissipation | 357 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 175 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | ℃ |

### Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient | --- | 45 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case | --- | 0 42 | ℃/W |

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## Electrical Characteristics: ($T_C$=25℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 200 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | --- | --- | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=60A | --- | 8.8 | 10.6 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$=250uA | 2 | 2.5 | 3 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | --- | --- | mV/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=200V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=200V, $V_{GS}$=0V , $T_J$=100℃ | --- | --- | 100 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=5V , $I_D$=60A | --- | 103.5 | --- | S |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 3.5 | --- | Ω |
| $Q_g$ | Total Gate Charge | $V_{DS}$=100V , $V_{GS}$=10V , $I_D$=60A | --- | 74 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 30 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 16 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{GS}$=10V, $V_{DD}$=100V, $R_G$=2.7Ω, $I_D$=60A | --- | 35 | --- | ns |
| $T_r$ | Rise Time | | --- | 111 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 84 | --- | |
| $T_f$ | Fall Time | | --- | 112 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=100V , $V_{GS}$=0V , f=1MHz | --- | 5268 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 462 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 24 | --- | |

### Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 120 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=60A , $T_J$=25℃ | --- | --- | 1.3 | V |
| $t_{rr}$ | Reverse Recovery Time | IF=17A , di/dt=100A/μs , $T_J$=25℃ | --- | 150.8 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 779.4 | --- | nC |

## Typical Performance Characteristics

Fig 1: Output Characteristics

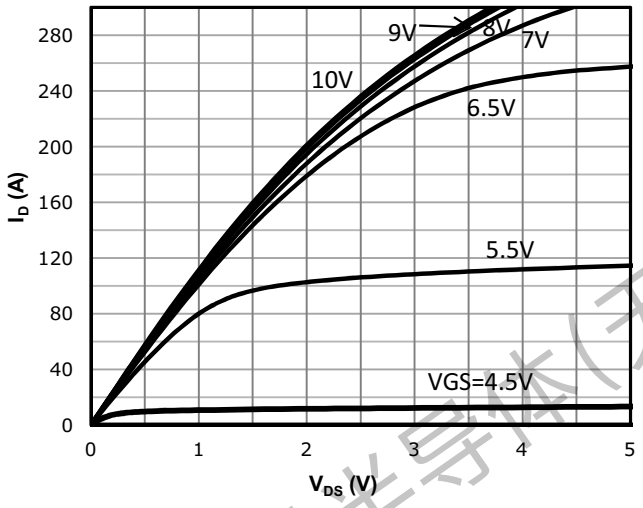



Fig 2: Transfer Characteristics

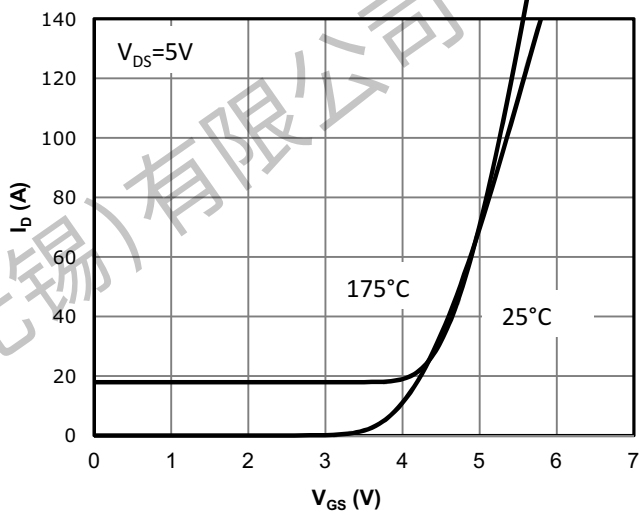



Fig 3: Rds(on) vs Drain Current and Gate Voltage

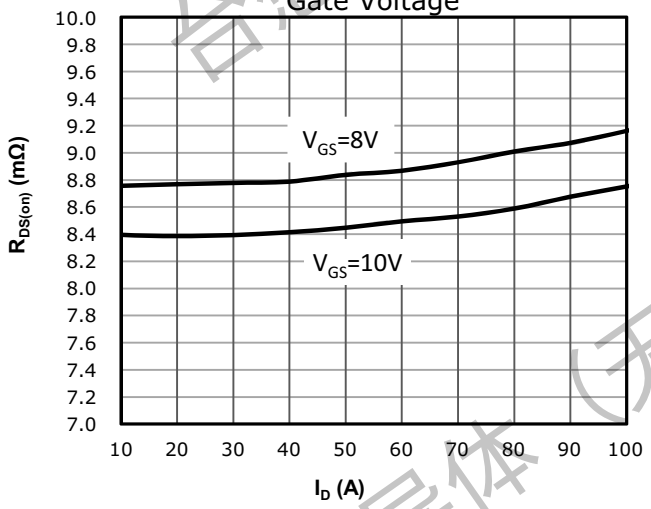



Fig 4: Rds(on) vs Gate Voltage

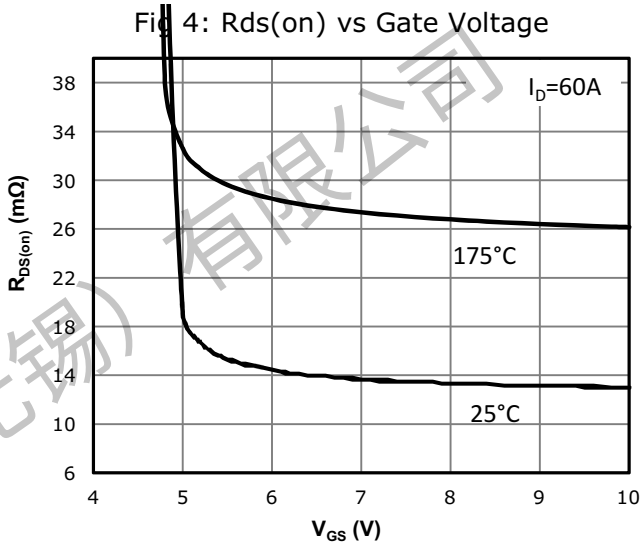



Fig 5: Rds(on) vs. Temperature

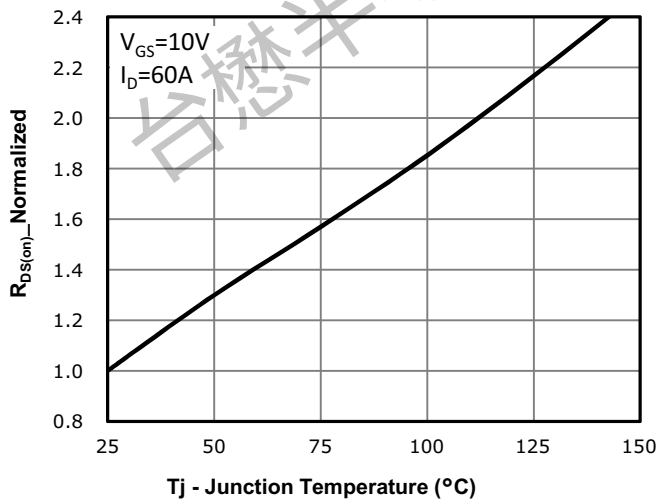



Fig 6: Capacitance Characteristics

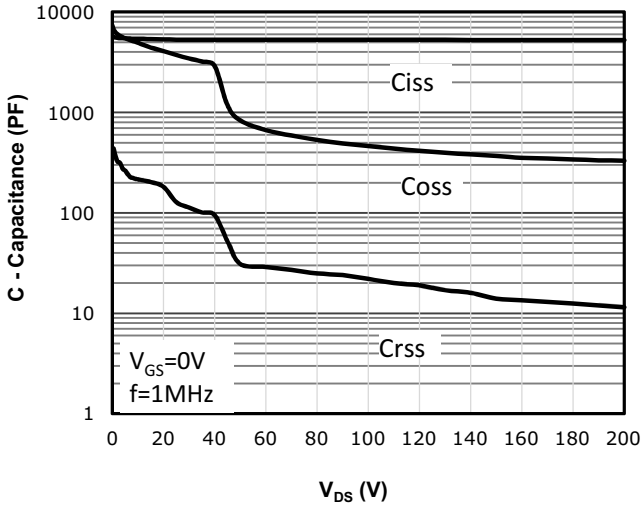


Fig 7: Vgs(th) vs. Temperature

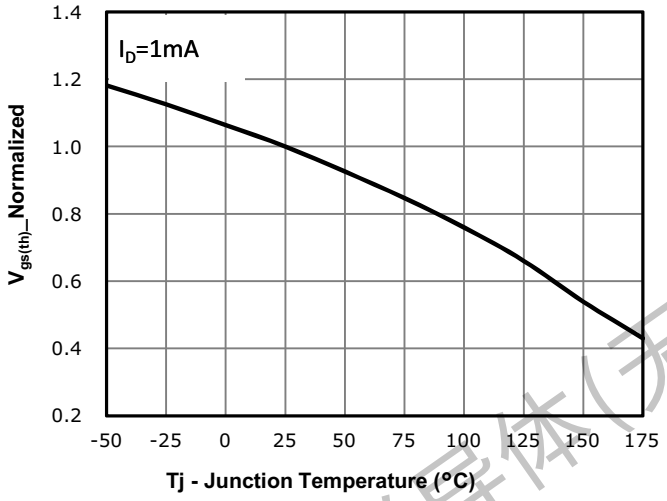



Fig 8: BVdss vs. Temperature

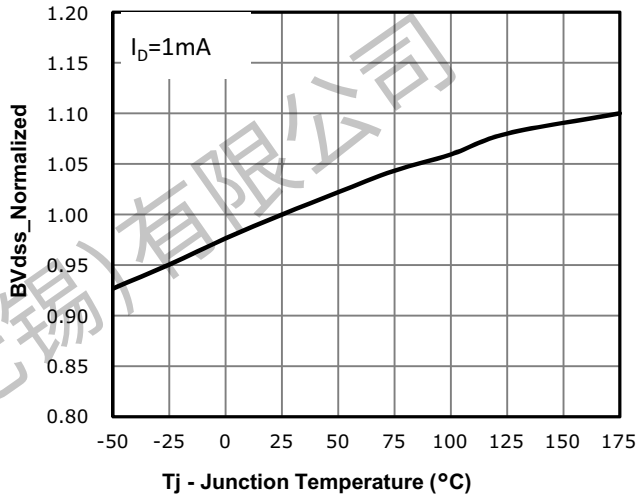



Fig 9: Gate Charge Characteristics

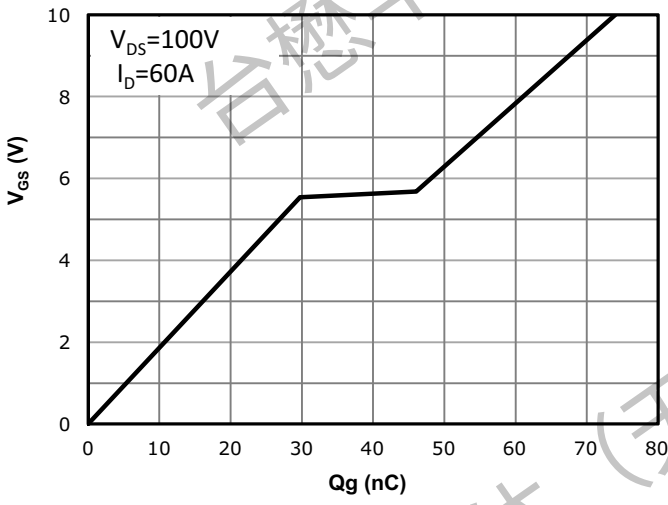



Fig 10: Body-diode Forward Characteristics

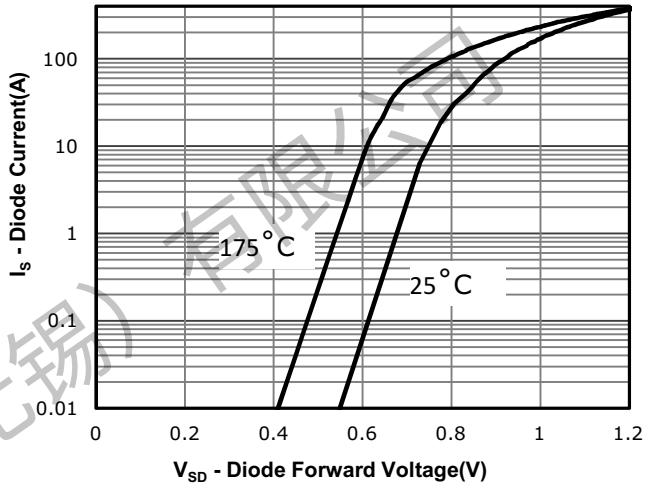



Fig 11: Power Dissipation

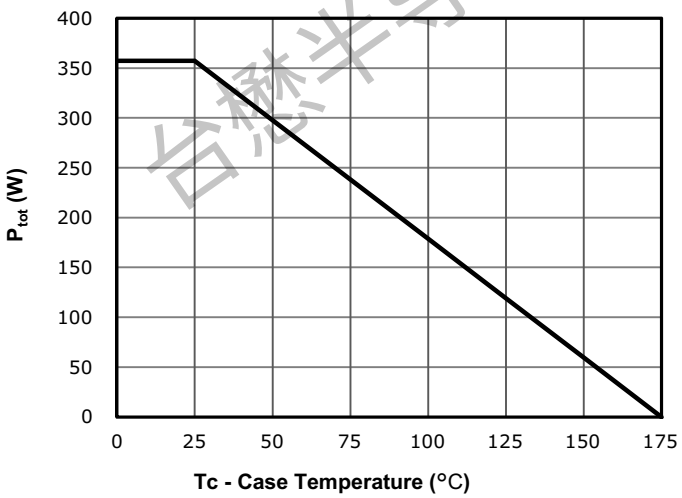



Fig 12: Drain Current Derating

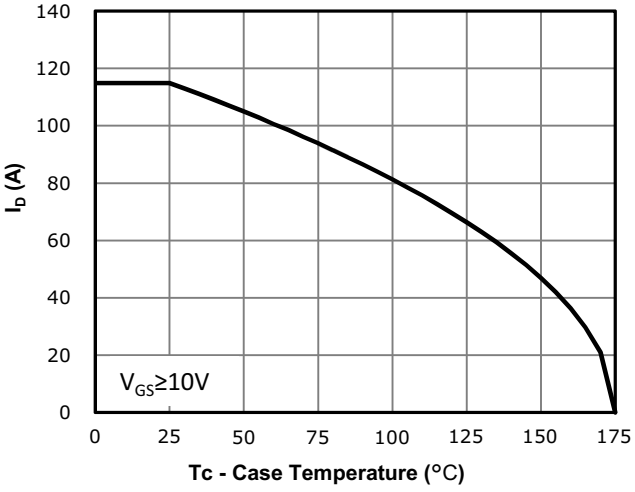


Fig 13: Safe Operating Area

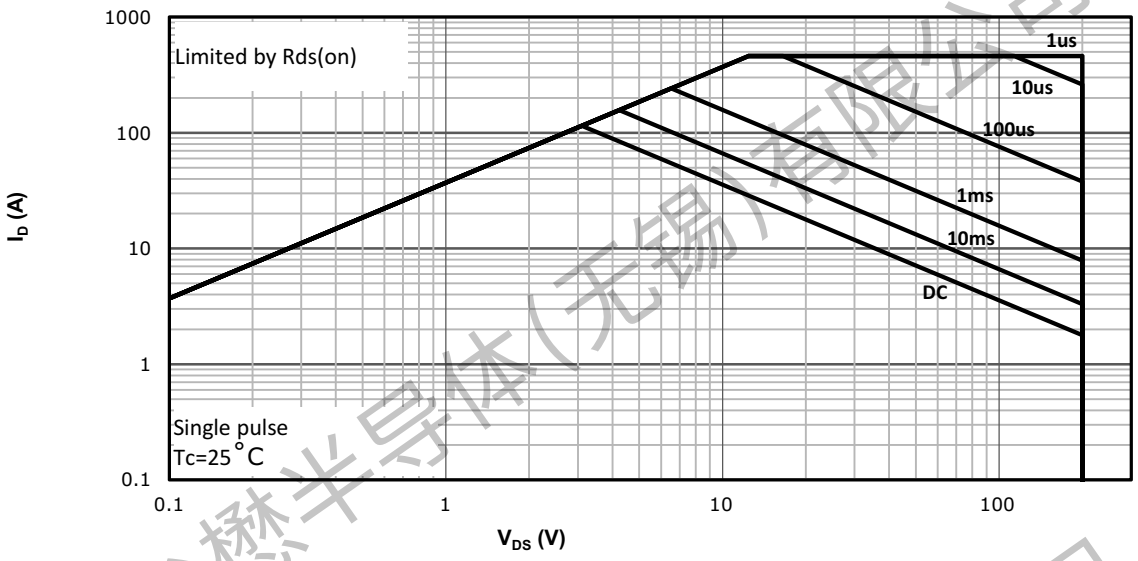
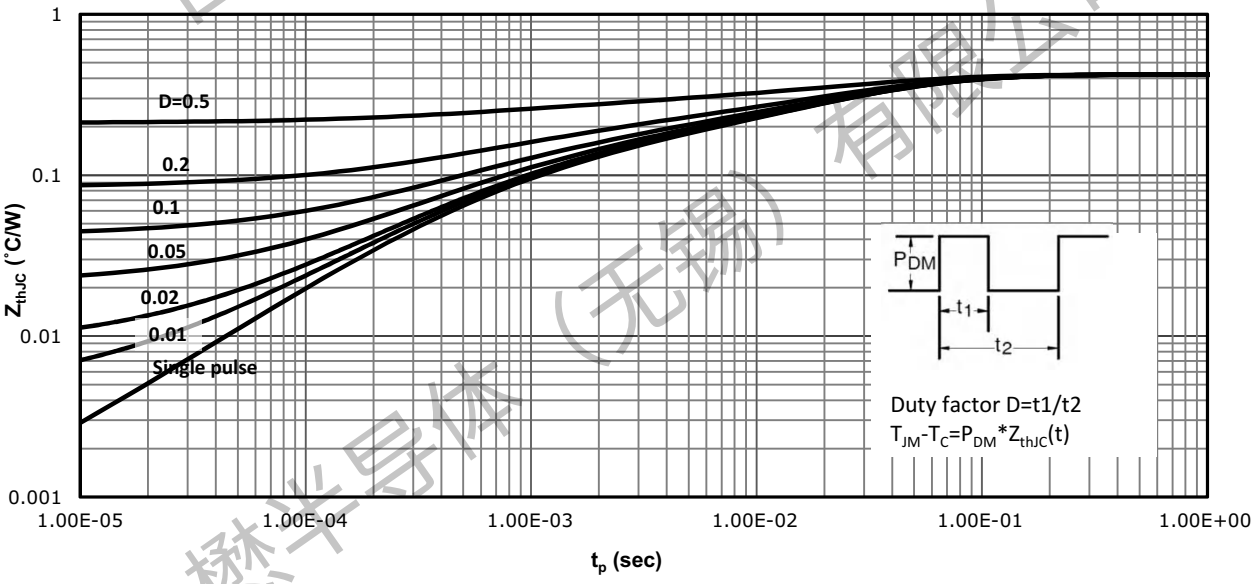



Fig 14: Max. Transient Thermal Impedance



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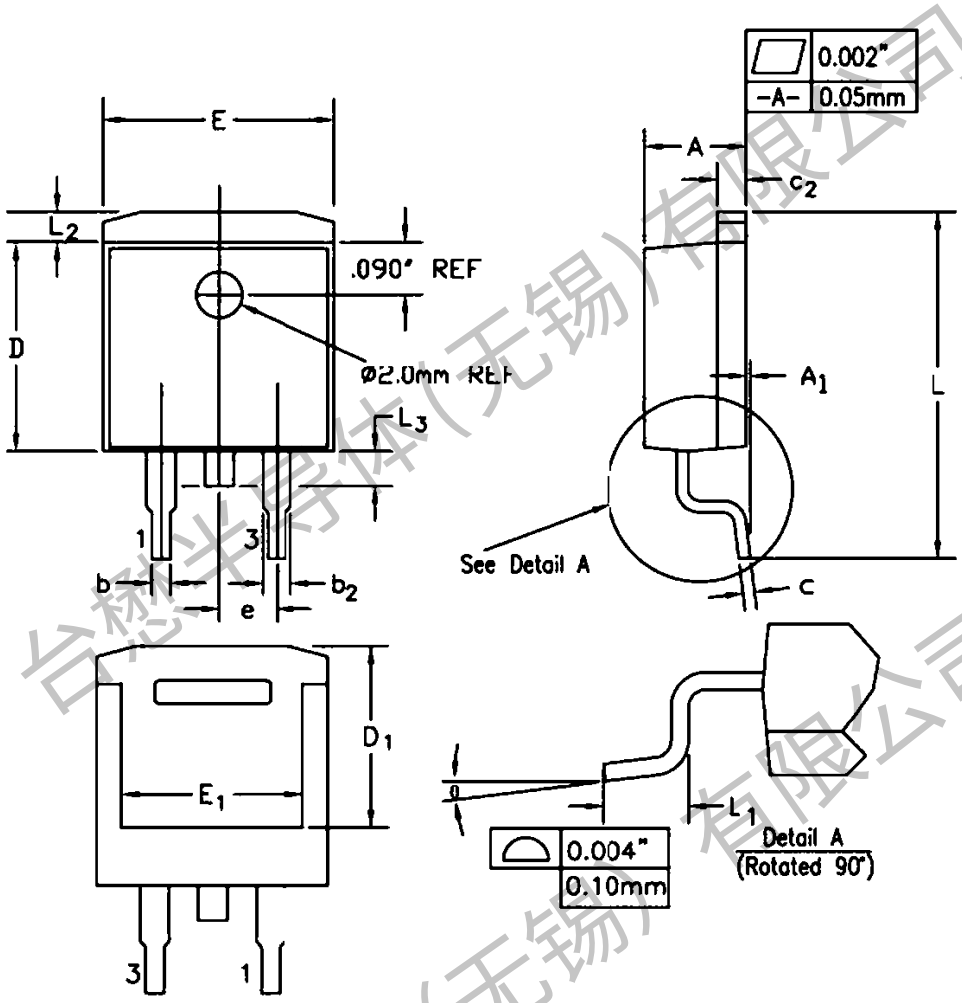
## Package Mechanical Data: TO-263-3L




| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|---|---|---|---|---|---|
| | MIN | MAX | MIN | MAX | |
| A | 0.170 | 0.180 | 4.32 | 4.57 | |
| A1 | - | 0.010 | - | 0.25 | |
| b | 0.028 | 0.037 | 0.71 | 0.94 | |
| b2 | 0.045 | 0.055 | 1.15 | 1.40 | |
| c | 0.018 | 0.024 | 0.46 | 0.61 | |
| c2 | 0.048 | 0.055 | 1.22 | 1.40 | |
| D | 0.350 | 0.370 | 8.89 | 9.40 | |
| D1 | 0.315 | 0.324 | 8.01 | 8.23 | |
| E | 0.395 | 0.405 | 10.04 | 10.28 | |
| E1 | 0.310 | 0.318 | 7.88 | 8.08 | |
| e | 0.100 BSC. | | 2.54 BSC. | | |
| L | 0.580 | 0.620 | 14.73 | 15.75 | |
| L1 | 0.090 | 0.110 | 2.29 | 2.79 | |
| L2 | 0.045 | 0.055 | 1.15 | 1.39 | |
| L3 | 0.050 | 0.070 | 1.27 | 1.77 | |
| θ | 0° | 8° | 0° | 8° | |

## Important Notices and Disclaimers

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Revision history:

| Date | Rev | Description | Page |
|---|---|---|---|
| 2023.12.11 | 23.12 | Original | |